conditions of the upper strata and of the ground along the slope of a given mountain range.

[A special series of observations for this purpose could advantageously be made by means of kites and balloons determining the exact conditions that prevail in the great westerly currents that bring steady rain to the coasts of Oregon and Washington, or in the easterly currents that bring rain to the Atlantic States and the Appalachian Range. The kite work done by the United States Weather Bureau in 1898, in the upper Mississippi watershed and Lake region, affords excellent examples for the application of general theorems of the circulation of the upper atmosphere, but do not happen to illustrate the great problem of the formation of general rains on mountain slopes.—ED.]

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR JULY.

By Prof. E. B. GARRIOTT, U. S. Weather Bureau.

The following statements are based on average weather conditions for July, as determined by long series of observations. As the weather for any given July does not conform strictly to the average conditions, the statements can not be considered as forecasts.

July is usually a quiet month on the North Atlantic Ocean. The storms of the middle latitudes are seldom severe, and the season of tropical hurricanes does not begin until August. July and August are the months of greatest fog frequency near the Banks of Newfoundland, and fog areas will be encountered in that region on fully two-thirds of the days of these months. The fogs of the Grand Banks and those of the steamer tracks to the westward usually occur with winds from the southeast quadrant. The southward movement of Arctic ice over the Banks of Newfoundland continues during July. Iceburgs do not, however, run so far south as during the spring months.

The general storms of the United States commonly originate on the middle-eastern or northeastern slope of the Rocky Mountains and move eastward over the northern Lake region, the St. Lawrence Valley, and Newfoundland without developing marked intensity. In the Pacific coast districts July and August are practically rainless months, and these are the driest months of the year in the middle and northern Plateau regions. In Arizona and New Mexico July and August are the wettest months of the year. From the Rocky Mountains to the Atlantic coast the heaviest monthly rainfalls of the year occur from June to August, and, as a rule, the greater part of the rain falls in showers or thunderstorms of short duration.

The frosts of July are confined, practically, to the northern tier of States and to mountain districts.

HAWAIIAN CLIMATOLOGICAL DATA FOR JULY, 1901.

By CURTIS J. LYONS, Territorial Meteorologist.

Meteorological observations at Honolulu, July, 1900.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 a. m., Honolulu time.								Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.			Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.	Average cloudiness.	Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.92	76	69	84	74	66.3	68	ne.	3	3	29.95	29.90	0.04
2	29.98	76	69	85	74	65.5	64	ne.	3–4	4	30.01	29.93	0.00
3	29.97	77	69.5	83	74	65.0	63	ne.	4–3	5	30.02	29.96	0.00
4	29.94	77	70.5	84	75	67.3	67	ne.	4–5	4	29.98	29.93	0.00
5	29.94	75	69	85	75	67.5	68	ne.	5–4	3–7	29.96	29.90	0.02
6	29.96	69	67.5	84	74	66.7	70	ne.	3–4	6	29.98	29.91	0.01
7	29.98	69	68.3	84	68	68.7	83	sw-n.	1–0	8–9	30.06	29.96	0.42
8	30.01	76	69.5	85	68	68.0	75	ne.	1–3	2	30.04	29.99	0.01
9	29.97	76	68	85	73	65.7	64	ne.	3	3	30.03	29.94	0.00
10	29.95	77	71	85	75	65.0	63	nne.	3–4	3–5	29.99	29.94	0.02
11	30.00	76	68	84	74	67.3	67	ne–nne.	5	4–1	30.03	29.94	0.03
12	29.97	77	67	82	72	64.0	64	ne.	6–5	3–9	30.04	29.96	0.02
13	29.95	75	69	82	75	64.7	63	ne.	4–6	5	30.02	29.93	0.23
14	29.96	77	69	83	72	66.3	67	ne.	4–5	6–8	30.01	29.94	0.01
15	29.95	74	70.5	85	75	66.3	67	ne.	3	3–5	30.00	29.94	0.06
16	29.96	74	68	84	71	67.3	72	ne.	2–4	3	30.02	29.94	0.03
17	29.94	76	68.5	85	73	66.0	66	ne.	3	6	30.00	29.93	0.01
18	29.98	75	68.5	85	74	65.3	63	ne.	3	2	30.01	29.93	0.14
19	29.99	76	72	84	70	66.7	68	ne.	3–5	4	30.03	29.96	0.10
20	30.00	76	71	84	73	70.3	79	ne.	4	4–8	30.06	29.99	0.06
21	29.98	76	69.5	84	73	67.7	69	ne.	4	6–2	30.03	29.96	0.00
22	29.96	75	69	84	74	65.7	64	ne.	3	2	30.01	29.96	0.01
23	29.92	69	67	84	74	66.7	70	ne.	4	6	29.99	29.91	0.01
24	29.89	71	69	84	68	66.0	71	ne.	3	3	29.95	29.89	0.05
25	29.93	68	66.7	80	69	67.5	77	ne.	2–0	6–10	29.96	29.88	0.04
26	29.94	76	68	85	67	66.7	71	ne.	2–3	3	29.99	29.92	0.01
27	29.96	76	69.5	83	74	65.7	64	ne	4	5	29.98	29.91	0.00
28	29.94	76	68	84	75	66.7	71	ne	5–2	5	29.99	29.91	0.05
29	29.95	76	69	84	74	64.7	63	ne.	4–2	3	29.98	29.89	0.01
30	29.94	75	68.5	84	75	64.0	61	ne.	4	4	30.00	29.93	0.01
31	29.94	75	68	83	74	64.0	62	ne.	3–4	8–4	29.99	29.93	0.12
Sums.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.53
Means.	29.957	74.7	68.9	83.9	72.7	66.2	68	.....	2.7	4.4	30.004	29.933	.....
Departure.	—0.026	.....	.....	.....	.....	+1.1	+1.2	.....	.....	+0.4	.....	.....	—0.27

Mean temperature for July, 1901 (6+2+9)+3=77.8°; normal is 77.3°. Mean pressure for July (9+3)+2 is 29.969; normal is 29.995.

GENERAL SUMMARY FOR JULY, 1901.

Temperature mean for the month, 77.8°; normal, 77.3°; average daily maximum, 83.9°; average daily minimum, 72.7°; average daily range, 11.2°; greatest daily range, 18°; least daily range, 7°; highest temperature, 85°; lowest, 67°.

Barometer average, 29.969; normal, 29.995 (corrected for gravity by —.06); highest, 30.06, on the 19th; lowest, 29.88, on the 24th; greatest 24-hour change, .08. On account of the evenness of pressure, lows and highs were hardly distinguishable; low pressure may be noted on the 4th and 24th, and high on the 11th and 19th. The barometer has been below the normal for four months in succession.

Relative humidity, 68; normal, 66.8; mean dew-point, 66.2°; normal, 65.1°; mean absolute moisture. 7.07 grains to the cubic foot; normal, 6.81.

Rainfall, 1.53 inch; normal, 1.80 inch; rain recorded days, 25; normal, 19; greatest rainfall in one day, 0.42 inch, on the 6th; total at Luakaha, 8.75 inches; at Kapiolani Park, 1.10 inch; at Kalihi-uka, 2.50 inches fell on the 6th. Total rainfall since January 1, 22.94 inches; normal, 20.62 inches.

The artesian well water stands at 33.40 feet above mean sea level at the Punahou well. The average mean sea level for the month stood at 10.42 feet above an assumed base, 9.00 feet being hydrographic zero (low water) and 10.00 feet standard mean sea level.

Trade-wind days, 30 (1 of north-northeast); normal for July, 29; average force, Beaufort scale, 2.7 (16 statute miles per hour). Cloudiness, tenths of sky, 4.4; normal, 4.0. Upper currents of air mostly from the southwest.

Percentages of district rainfall as compared with normal: Hilo, 40 per cent; Hamakua, 17; Kohala, 20; Waimea, 14; Kona, 125; Kau, 50; Puna, —; Maui, probably 100; Oahu, 100; Kauai, 250 to 320. The lack of water in North Hawaii is quite serious.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, average maximum, 78.6°; average minimum, 69.3°. Waimae, Hawaii, 2,730 feet elevation, 77.8° and 65.9°. Kohala, 521 feet elevation, 80.9° and 71.5°. Ewa Mill, Oahu, 50 feet elevation, 86.6 and 69.4. Kulaokahua, W. R. Castle's 60 feet elevation, highest, 87°; lowest, 68; average, 77.9°. The prevailing heat of the Northern Hemisphere has not affected these islands.

No earthquake reported. It is unofficially reported that Kilauea shows fire through its floor. Thunder and lightning on Hawaii on the 18th, and on Oahu on the 19th. Snow fell on Mauna Kea on the 18th. Heavy swell on the 3d, 9th to 14th, and 29th.

On June 30 large quantities of fresh black pumicestone were found floating in the bay at Kealakekua.

The high average level of the sea for the months of June and July has attracted some attention. It is doubtless due to meteorological conditions, perhaps in the South Pacific.

Under date of August 19, 1901, Mr. Lyons says:

Perhaps you have the means of knowing whether the barometric pressure in the South Pacific and Australia has been higher than usual during the summer months. The unusual height of mean sea level, as determined by our self-recording tide gage has attracted some attention. There is always as you know a change in sea level either at different seasons of the year, or at certain as yet unknown periods, but it has been about 0.3 foot greater than usual this season.

Rainfall data for the Hawaiian Service.

Stations.	Elevation.	July, 1901.	Stations.	Elevation.	July, 1901.
HAWAII.			MAUI—*Continued.*		
HILO, e. and ne.	*Feet.*	*Inches.*	Hamoa Plantation, se	60	2.76
Waiakea	50	4.76	Nahiku, ne	60	.....
Hilo (town)	100	.....	Nahiku (Lemmon, ne	990	10.56
Kaumana	1,250	7.19	Haiku, n	700	3.52
Pepeekeo	100	4.97	Kula (Erehwon), n	4,500	1.01
Hakalau	200	4.01	Puuomalei, n	1,400	.....
Honohina	300	3.83	Paia, n	180	1.14
Laupahoehoe	500	.....	Haleakala Ranch, n	2,000	1.94
Ookala	400	1.45	Wailuku	200	.....
HAMAKUA, ne.			LANAI.		
Kukaiau	250	0.70	Keomuku, e	6	.....
Paauilo	750	0.85	OAHU.		
Paauhau (Gibb)	300	0.44	Punahou (W. B), sw	47	1.53
Paauhau (Greig)	1,150	0.50	Kulaokahua, sw	50	0.59
Honokaa (Muir)	425	0.57	Kewalo (King street), sw	15	0.87
Honokaa (Rickard)	1,900	0.30	United States N. S., sw	6	0.48
Kukuihaele	700	0.65	Kapiolani Park, sw	10	1.10
KOHALA, n.			Manoa (Woodlawn Dairy), c	285	5.54
Awini Ranch	1,100	.....	Makiki Reservoir	150	1.84
Niulii	200	1.01	School street (B shop), sw	50	1.95
Kohala (Mission)	521	1.37	Pacific Heights, sw	700	4.11
Kohala (Sugar Co.)	225	.....	Insane Asylum, sw	80	1.72
Hawi	300	.....	Kalihi-uka	260	8.60
Hawi Mill	600	1.47	Nuuanu (W. W. Hall), sw	50	1.43
Waimea	2,720	0.32	Nuuanu (Wyllie street), sw	250	3.09
KONA, W.			Nuuanu (Elec. Station), sw	405	4.23
Kailua	950	6.61	Nuuanu (Luakaha) c	850	8.75
Kealakekua	1,580	8.07	Waimanalo, ne	25	1.20
Napoopoo	25	.....	Maunawili, ne	300	4.02
KAU, se.			Kaneohe, ne	100	.....
Honuapo	15	0.26	Ahuimanu, ne	350	7.24
Kakuku	1,680	2.78	Kahuku, n	25	2.26
Naalehu	650	1.03	Waialua, n	20	.....
Hilea	310	3.10	Wahiawa, c	900	2.00
Pahala	850	1.21	Ewa Plantation, s	60	0.30
Moaula	1,700	3.17	Waipahu, s	200	0.68
PUNA, e.			Moanalua, sw	15	1.18
Volcano House	4,000	2.80	KAUAI.		
Olaa	.....	.....	Lihue (Grove Farm), e	200	5.90
Olaa	.....	.....	Lihue (Molokoa), e	300	6.49
Kapoho	110	.....	Lihue (Kukaua), e	1,000	12.36
Kalapana, se	8	.....	Kealia, e	15	.....
MAUI.			Kilauea, ne	325	9.91
Olowalu	.....	.....	Hanalei, n	10	11.90
Lahaina	.....	.....	Walawa, sw	32	1.83
Waiopae Ranch, s	700	0.00	Eleele, s	200	4.72
Kaupo (Mokulau), s	285	4.85	Walawa, Mountain, s	2,100	28.25
Kipahulu, s	300	5.68	McBrides (Res.)	850	8.51

Records not hitherto published, June, 1901.

Nuuanu (Wyllie street)	.....	3.88	Kahikinui (Maui)	.....	0.36
Kula (Erehwon)	.....	3.11	Laupahoehoe	.....	0.95

NOTE.—The letters n. nw. e. sw. se. ne. and s. attached to each name indicate the exposure or direction toward which localities face; "c," central locality.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

American Journal of Science, New Haven, Conn. 4th Series. Vol. 12.

Liveing, G. D. and Dewar, James. On the Separation of the Least Volatile Gases of Atmospheric Air and their Spectra. Pp. 207–215.

Dewar, James. The Nadir of Temperature and allied problems. Pp. 168–172.

Adams, Edwin P. The Electromagnetic Effects of Moving Charged Spheres. Pp. 155–167.

Davis, J. Woodbridge. On the Motion of Compressible Fluids. Pp. 107–114.

Annuaire de la Société Météorologique de France. Tours. 49me année.

Besson, Louis. Mesure de la direction et de la vitesse en ballon. Pp. 163–165.

Besson, Louis. L'ascension internationale du 19 avril, 1901, à Paris. Pp. 161–163.

Lemoine, G. et Maillet, E. Sur le débit probable des sources pendant la saison chaude de 1901, Pp. 159–161.

Ritter, Charles. Le nuage et son rôle dans la production de la pluie. Pp. 137–141.

Annalen der Physik. Leipzig. Vierte folge. Band 5.

Angstrom, K. Ueber die Abhängigkeit der Absorption der Gase, besonders der Kohlensäure. Pp. 163–173.

Kapp, A. W. Studien über das Luftthermometer. Pp. 905–918.

Lemstrom, Selim. Uber das Verhalten der Flüssigkeiten in Capillarröhren unter Einfluss eines elektrischen Luftstromes. Pp. 729–756.

Annales Agronomiques. Paris. Tome 27.

Charabot, —. Influences simultanées séparées de la lumière, de l'altitude, de l'état hygrométrique, de la température, sur la croissance des végétaux. P. 383.

Annalen der Hydrographie und Maritimem Meteorologie. 29 Jahrg.

Knipping, E. Sturmtabellen für den Atlantischen Ozean. Beiheft I. P. 19.

Archives des Sciences Physiques et Naturelles. Genève. Tome 12.

Finsterwalder, S. et Muret, E. Les variations périodiques des glaciers. 6me rapport. 1900. Rédigé au nom de la Commission internationale des glaciers. Pp. 118–132.

Ebert, Hermann. Sur les ions libres de l'air atmosphérique. Pp. 97–118.

Forel, F. A. Étude thermique des lacs du nord de l'Europe. Pp. 35–55.

Ciel et Terre. Bruxelles. 22me année.

——. Hauteur des nuages. P. 280.

V. D. L. La pluie de poussière des 10 et 11 mars, 1901. P. 257–262.

Lancaster, A. La température [1833–1892 à Bruxelles, 1893–1900 à Uccle]. Pp. 249–251.

Linden, E. Vander. Pluie dans un anticyclone. Pp. 229–233.

Rahir, E. Photographies du brouillard. Pp. 295–296.

Comptes Rendus. Paris. Tome 133.

Cosserat, Eugene et Francois. Sur la déformation infiniment petite d'une enveloppe sphérique. Pp. 326–329.

Stanoiewitch, G. M. Méthode électro-sonore pour combattre la grêle. Pp. 373–374.

Das Wetter. Braunschwig. 18 Jahrg.

Assmann, [Richard]. Die Hitze und Dürre des diesjahrigen Sommers in Deutschland. Pp. 161–168.

Electrical World, New York. Vol. 38.

Reichel, Walter. [Air Resistance to Rapidly Moving bodies; in article] Zossen Polyphase Railway Experimental Trials with Speeds up to 125 Miles per Hour. Pp. 367–372.

Gaea. Leipzig. 37 Jahrg.

Klein, Hermann. Die Erforschung der Atmosphäre und deren Bedeutung. Pp. 513–527.

Geographical Journal. London. Vol. 18.

Cornish, Vaugham. On Sand-Waves in Tidal Currents. Pp. 170–202.

National Geographical Magazine. New York. Vol. 12.

Page, James. The Drift of Floating Bottles in the Pacific Ocean. Pp. 337–339.